Express5800/320Fc: Site Planning Guide

NEC Corporation of America
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NEC Corporation of America
10850 Gold Center Drive, Suite 200
Rancho Cordova, CA 95670

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Contents

Preface vii

1. Welcome to Site Planning for Express5800/320Fc 1-1
- Site Planning Overview 1-1
- Site Planning for Fault-Tolerant Systems 1-2
- Site Planning Checklist 1-3
- System Documentation 1-5

2. Cabinet and Monitor Requirements 2-1
- Cabinet Requirements 2-1
- Monitor Requirements 2-4

3. Space Planning 3-1
- Room Requirements 3-1
- Planning for Cables 3-2

4. Electrical (AC) Power Planning 4-1
- Redundant Power Sources 4-1
- AC Power Service Requirements 4-2
- Power Outlet Requirements 4-4
- Connecting a System Directly to Two Separate Power Sources 4-5
- NEC-Supplied Power Cords 4-6
  - System Power Cords 4-7
  - PDU Power Cords 4-8
  - Power Cords for Optional Components 4-9

5. UPS Planning 5-1

Qualified APC UPS Models 5-1
Communicating with a UPS over a Network 5-2
Connecting Power to Systems, PDUs, and a UPS 5-2
Connecting a System Directly to a UPS 5-3

6. Network and Telephone Line Planning 6-1
Network Cable Requirements 6-1
Telephone Line Requirements 6-2
Site Planning for Systems in an ftGateway Group 6-3

Appendix A. System Specifications A-1
System Specifications A-1

Appendix B. Electrical Circuit and Wiring Information B-1
Fault Protection Requirements B-1
Grounding Considerations B-1
Circuit Wiring Diagrams B-3
Electrical Power Connectors B-9

Appendix C. Standards Compliance C-1

Index Index-1

Figures

Figure 2-1. Rail Clearance 2-3
Figure 4-1. Pedestal System Connected Directly to AC Power 4-6
Figure 5-1. Power Cord Connections for Systems, PDUs, and a UPS 5-3
Figure 5-2. Pedestal Systems: A-Side Power Connected Directly to a UPS 5-4
Figure A-1. Pedestal System - Front View A-2
Figure A-3. Pedestal Express5800/320Fc systems- Rear View A-4
Figure B-1. Star Ground Example B-2
Figure B-2. Power Input Labeling B-3
Figure B-3. Single-Phase 120-Volts AC Circuit Connection B-4
Figure B-4. Single-Phase 240-Volts AC Circuit Connection B-5
Figure B-5. Split-Phase 120/240 Volts AC Circuit Connection B-6
Figure B-6. Three-Phase 208-Volts AC, Y-, or Δ-Source Circuit Connection, Phase-to-Neutral B-7
Figure B-7. Three-Phase 208-Volts AC, Y-, or Δ-Source Circuit Connection, Phase-to-Phase B-8
Figure B-8. Three-Phase 380V AC, Y-, or Δ-Source Circuit Connection, Phase-to-Neutral B-9

Tables

Table 1-1.	Ethernet PCI Adapters	1-4
Table 1-2.	Optical Fibre Channel PCI Adapters	1-4
Table 4-1.	AC Power Service Requirements	4-2
Table 4-2.	Worksheet for Determining A-Side Power Requirements	4-3
Table 4-3.	Worksheet for Determining B-Side Power Requirements	4-3
Table 4-4.	Worksheet for Determining External Power Requirements	4-3
Table 4-5.	Worksheet: A-Side External Power Outlet Requirements - PDUs Used	4-4
Table 4-6.	Worksheet: B-Side External Power Outlet Requirements - PDUs Used	4-4
Table 4-7.	Worksheet: A-Side External Power Outlet Requirements - No PDUs	4-5
Table 4-8.	Worksheet: B-Side External Power Outlet Requirements - No PDUs	4-5
Table 4-9.	System Power Cords to AC Power	4-7
Table 4-10.	Systems: Power Cords to a UPS	4-7
Table 4-11.	PDU Power Cords to AC Power	4-9
Table 4-12.	System Power (*Jumper*) Cables to a PDU	4-9
Table 4-13.	Power Cords for Optional Components	4-9
Table 5-1.	APC Symmetra Models for PDUs or for Multiple Systems	5-1
Table 5-3.	APC UPS Models for a Single Pedestal System	5-2
Table 6-1.	Customer-Supplied Ethernet Cables	6-2
Table A-1.	Pedestal System Specifications	A-5
Table B-1.	Connectors for AC Power Outlets	B-10
Table C-1.	EMI Standards	C-2
Table C-2.	Immunity Standards	C-2
Table C-3.	Safety Standards	C-2
Table C-4.	Noise Standards	C-2

Preface

Purpose of This Manual

The *Express5800/320Fc: Site Planning Guide* documents the site requirements and customer responsibilities related to preparing a site for the installation of Express5800/320Fc systems.

Audience

This manual is intended for those responsible for preparing a site for the installation of an Express5800/320Fc system.

Notation Conventions

This document uses the notation conventions described in this section.

Warnings, Cautions, and Notes

Warnings, cautions, and notes provide special information and have the following meanings:

WARNING

A warning indicates a situation where failure to take or avoid a specified action could cause bodily harm or loss of life.

CAUTION

A caution indicates a situation where failure to take or avoid a specified action could damage a hardware device, program, system, or data.

NOTE

A note provides important information about the operation of an Express5800/320Fc system.

Typographical Conventions

The following typographical conventions are used in Express5800/320Fc documents:

- The bold font emphasizes words in text or indicates text that you type or the name of a screen object. For example:

  Before handling or replacing a PCI adapter, make sure that you are properly grounded by using a grounded wrist strap.

  In the **System Properties** dialog box, click the **Hardware** tab.

- The italic font introduces new terms. For example:

  Many hardware components are *customer-replaceable units* (CRUs), which can be replaced on-site by system administrators with minimal training or tools.

  copy *filename1 filename2*

- The monospace font indicates message text. For example:

  ```
  The operation completed successfully.
  ```

Getting Help

If you have a technical question about Express5800/320Fc hardware or software, try these online resources first:

- **Online support from NEC Technical Support.** You can find the latest technical information about an Express5800/320Fc through online product support at the NEC Technical Support Web site:

  http://support.necam.com/servers/ft

- **Online product support for Microsoft® products**. Your primary source for support is the computer manufacturer who provided your software, or an authorized Microsoft Support Provider. You can also find the latest technical information about Microsoft Windows® and other Microsoft products through online product support at the Microsoft Help and Support Web site:

  http://support.microsoft.com/

If you are unable to resolve your questions with the help available at these online sites, and the Express5800/320Fc system is covered by a service agreement, please contact NEC Technical Support (866-269-1239).

Notices

- All regulatory notices are provided in Appendix C, “Standards Compliance” of this site planning guide.
- Although this guide documents modem functionality, modems are not available for all systems. Ask your sales representative about modem availability.

Chapter 1
Welcome to Site Planning for Express5800/320Fc

For an overview of the information you need to know and of the tasks you need to perform to prepare a site for an Express5800/320Fc system, see:

- "Site Planning Overview" on page 1-1
- "Site Planning for Fault-Tolerant Systems" on page 1-2
- "Site Planning Checklist" on page 1-3
- "System Documentation" on page 1-5

Site Planning Overview

Site planning for fault-tolerant systems includes:

- Space planning

  Provide adequate space for the system or cabinet and for a desk or table to accommodate components outside a cabinet. Also provide enough space for servicing the systems and components.

- Purchasing an appropriate cabinet and monitor

  If you do not purchase a monitor from NEC Corporation of America, provide a monitor that meets the system's requirements.

  If you do not purchase the cabinet that NEC Corporation of America references, provide a cabinet that meets the system's requirements.

- Electrical (AC) power planning

  Provide electrical power sources that meet the system's requirements, optionally including the purchase of a qualified uninterruptible power supply (UPS).

- Network and telephone line planning

  Provide sufficient network and analog telephone lines.

Use the “Site Planning Checklist” on page 1-3 to track your site preparation progress.

For a list of other documents related to your Express5800/320Fc system, see “System Documentation” on page 1-5.

During the site planning and preparation processes, work closely with your facilities group or contractor to determine space, power, and environmental requirements. Enlist their help to provide a suitable location with sufficient alternating current (AC) power, heating, ventilation and air conditioning (HVAC) capabilities, and network and telephone connections.

If your system is covered by a service agreement and you need help with site planning, contact the NEC Technical Support. If you have a contract with the NEC Technical Support to install the system, contact them after you have prepared the installation site and moved the system to the site. For more information about NEC Technical Support, visit http://support.necsam.com/servers/ft.

See Appendix A, “System Specifications” for Express5800/320Fc system specifications and the *Express5800/320Fc: Peripherals Site Planning Guide* for specifications of other components.

Site Planning for Fault-Tolerant Systems

Consider the following specific fault-tolerant features of Express5800/320Fc systems for site planning:

- *Lockstep technology* means that the Express5800/320Fc systems contain redundant hardware. The Express5800/320Fc systems contain two enclosures, each containing a full computing environment that consists of a CPU element and an I/O element.

  If a component in a CPU element malfunctions, the corresponding CPU element in the other enclosure, which is processing the same information in *lockstep*, continues processing without interruption. If a component in the I/O element malfunctions, the system fails operation over to the corresponding element in the other enclosure and continues to operate normally. The only consequences are that the system is less fault tolerant, and any I/O throughput distributed between the enclosures may be reduced. To restore full fault tolerance, an enclosure can be replaced without taking the system offline.

Site Planning Checklist

Referring to the information in this document, answer the following questions:

Planning for Optional Components

- ❑ The system contains four 10/100/1000 megabits-per-second (Mbps) Ethernet ports. Will your system additionally include any of the following PCI adapters for network communications? If so, indicate how many of each and plan network connections for all Ethernet ports you will use.

Table 1-1. Ethernet PCI Adapters

Adapter	Number of Ports
Dual-Port Copper Gigabit Ethernet Adapters	2
1000 Base T	2
1000 Base T-SX	2

❏ Will you supply your own monitor or will NEC Corporation of America supply the monitor?

NOTE

Use the USB keyboard and mouse provided by NEC Corporation of America.

❏ Will the components in a cabinet include a keyboard-video-mouse (KVM) switch?

Planning AC Power

❏ Will you provide power through a power distribution unit (PDU)?

❏ Will you provide power from a UPS?

❏ What are the AC power requirements of your system, including all optional components?

❏ Is the AC power service wired properly?

❏ What are the lengths and types of the power cords that are provided with your system? What type of receptacles do you need to provide?

Planning Space for Your System

❏ Will your system and its external components fit where you plan to place them?

- ❏ What are the lengths and types of the cables that will connect to your system?
- ❏ Have you created a sketch of how you plan to arrange the system at the installation site? Consider the available cable lengths, the placement of external devices, and the location of network and voice communication connections.

  On the sketch, show the following:

  - Location of the system and its external components
  - Power cords, and telephone and interface cables
  - Locations of AC power receptacles, phone jacks, Ethernet jacks, switches, and/or hubs

  NOTE

  Make sure that all cords and cables are long enough to reach between their respective components and connectors. Route all cables out of the way of foot traffic.

Working with Other Groups

- ❏ Have you provided your facilities group and contractors with the sketch and copies of the following?
  - Tables 4-2, 4-3, and 4-4, worksheets for determining AC power requirements
  - Tables 4-5 and 4-6 or Tables 4-7 and 4-8, worksheets for determining the number of external power outlets required
  - Appendix B, “Electrical Circuit and Wiring Information”
  - Any notes you have about site planning
- ❏ Have you reviewed and discussed the requirements with the facilities personnel and contractors to ensure that all site modifications are understood and implemented?

If you have any questions about the number and types of components, contact your Express5800/320Fc account executive or distributor.

System Documentation

When you receive your system, you receive a printed copy of the *Express5800/320Fc: Installation Guide*. The software installation program lets you install an online copy of this document, along with other Express5800/320Fc system documentation, on your system. You also have the option to install documentation on a remote system. The **Express5800/320Fc Help and Manuals** folder on the Windows desktop, contains these documents.

To order additional documentation, visit the NEC Technical Support Web site:

http://support.necam.com/servers/ft

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Chapter 2
Cabinet and Monitor Requirements

For requirements related to supplying your own cabinet and monitor, see:

- "Cabinet Requirements" on page 2-1
- "Monitor Requirements" on page 2-4

Cabinet Requirements

If you are providing your own cabinet for an Express5800/320Fc, make sure the cabinet contains a rack that is 19-in. wide and that meets the Electronic Industries Association (EIA) 310-D standard.

Make sure that:

- The cabinet contains two front and two rear vertical EIA rails, one in each corner of the cabinet, that have the EIA universal square-hole pattern as defined in the EIA 310-D specification.
- The front vertical rails extend at least 0.5 in. (1.27 cm) beyond the inside edge of the accessory leg, if present, to allow the mounting rails to be fitted. See Figure 2-1.
- The distance between the front and rear vertical rails is between 24.5 in. and 30 in. (62.23 cm and 76.20 cm).
- The vertical mounting rails accept 10-32 cage nuts and mounting hardware.
- The distance between the front vertical rails and the inside of the front door is at least 3.0 in. (7.62 cm).
- The distance between the rear of the system chassis and the inside of the rear door is at least 6.0 in. (15.24 cm).
- The vertical mounting rails are plated or some other method is used to ensure continuity for grounding between installed equipment.
- Cable management brackets are provided to support and constrain data and power cords so that the cables do not interfere with air flow out of the rear of the enclosures, and so that the connectors do not disconnect or break.
- The cabinet provides enough stability so that system components pass Telcordia® GR-63-CORE Section 5.4.2 regulations for operational vibration.

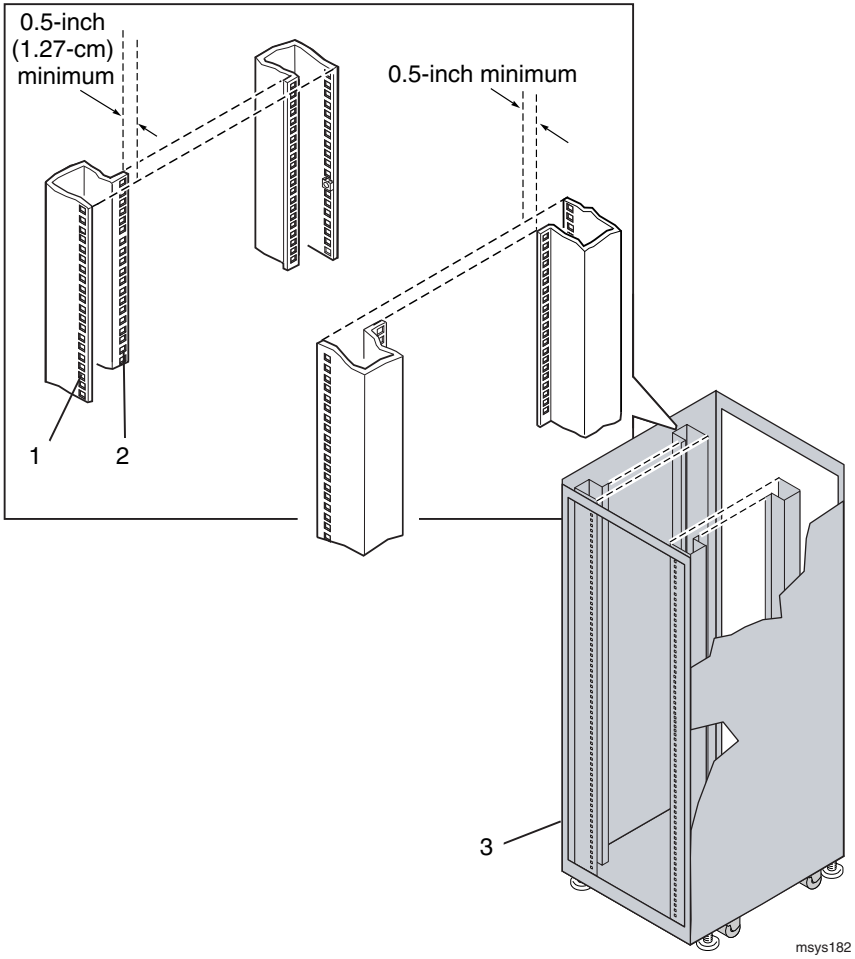
- To prevent stray voltages, all components are grounded together through the vertical mounting rails to the cabinet frame, and then to local building ground. To ensure signal quality, use a grounding cable provided by NEC Corporation of America for local building ground.
- There is a plan for maintaining cables and wires to the cabinet by either running them under the floor or placing them overhead in an overhead cable tray.
- Air flows through the cabinet from front to back.
- Filler panels cover any unused rack space to prevent air recirculation.
- Vents are evenly distributed on the front and rear doors and comprise at least 63% of the surface area.

NOTE

If your cabinet does not have vented front and rear doors, you can remove the doors from the cabinet while your Express5800/320Fc system is operating.

Figure 2-1 shows the required rail clearance between the front vertical rails and the inside edge of an accessory leg.

Figure 2-1. Rail Clearance



1 Front vertical EIA rail

2 Accessory leg

3 Front of cabinet

Monitor Requirements

If you are using a monitor that is not supplied by NEC Corporation of America, make sure that:

- The monitor accepts universal 100–240 VAC, 50/60 Hz power.
- The VGA cable has a 15-pin D-sub connector.
- The power cord for the monitor is long enough to reach the power source.
- The plug type on the power cord is compatible with the external power source at the site.

Use the keyboard and mouse provided by NEC Corporation of America.

Chapter 3
Space Planning

For information about planning sufficient space for your Express5800/320Fc system, see:

- "Room Requirements" on page 3-1
- "Planning for Cables" on page 3-2

Room Requirements

To ensure that the installation site provides a properly equipped, cooled, and sized environment, make sure that the site:

- Provides clearances for air circulation and servicing the system

  Locate the front and rear of the system at least 2.5 ft (0.76m) away from walls and other obstructions.

- Maintains reasonable temperature and humidity levels and has a thermometer and humidistat to monitor room temperature and humidity
- Is as free of dust as possible

  Dust buildup in the system can impede air circulation and heat transfer, causing components to become less reliable as the ambient temperature rises.

- Provides a table or desktop for external devices such as a telephone, keyboard, and mouse
- Provides cutouts in the floor for routing cables, if the site has an elevated floor

CAUTION

Do not place the system in an area of high electrostatic discharge. Static electricity may damage components. Do not locate components near transformers or other electromagnetic devices.

See Appendix A, "System Specifications" for the dimensions of system components.

Planning for Cables

To accommodate cables from your Express5800/320Fc system, make sure to provide:

- One telephone line for use when calling for service
- Ethernet jacks, switches, or hubs, as needed
- Two electrically separate grounded AC wall outlets, or a UPS and a wall outlet, within reach of the power cords from the system or PDUs and additional outlets for any components that do not connect to a PDU

Make sure that cables you plan to connect to the system are long enough to reach between the system and external components or connections.

Chapter 4
Electrical (AC) Power Planning

For information about planning appropriate AC electrical power for your Express5800/320Fc system, see:

- "Redundant Power Sources" on page 4-1
- "AC Power Service Requirements" on page 4-2
- "Power Outlet Requirements" on page 4-4
- "Connecting a System Directly to Two Separate Power Sources" on page 4-5
- "NEC-Supplied Power Cords" on page 4-6

Related Topics

- Chapter 5, "UPS Planning"

Redundant Power Sources

Express5800/320Fc systems require at least two separate and independent AC power sources–an *A-side* power source and a *B-side* power source–that provide power to the system's power receptacles, labeled, respectively, A and B. Either source must be capable of continuing to provide power if power to the other source is lost.

The A-side power source provides power to components that do not require two sources of power: a KVM switch. If you use an uninterruptible power supply (UPS), the UPS is the A-side power source.

The B-side power source provides power to the other side of each system.

The wattage required from the A-side power source will always be equal to or greater than the wattage required from the B-side power source.

AC Power Service Requirements

Table 4-1 describes the nominal input line voltage (volts AC) and frequency (Hz) required for your system and optional components. The table also provides a reference to a table that lists the receptacles to provide for each component.

Table 4-1. AC Power Service Requirements

Component	Nominal Input Voltage; Nominal Frequency Range	Receptacle
Express5800/320Fc system	100–240V; 50/60 Hz	See Table 4-9.
PDU	200–240V; 50/60 Hz	See Table 4-11.
KVM switch	100–240V; 50/60 Hz	See Table 4-13.

The power service must be properly wired and grounded according to local standards and regulations. See Appendix B for electrical circuit and wiring information.

NOTE

Circuit breakers must provide a protective earth ground current at a maximum of 3.5 milliamperes for each AC power cord.

Use the following worksheets to determine AC power requirements for the site.

- In Table 4-2, determine the power requirements at the A-side power source.
- In Table 4-3, determine the power requirements at the B-side power source.
- In Table 4-4, determine the power requirements for components outside of the cabinet. These components can share a power source with the A-side or B-side components.

To determine power requirements

Provide information in Tables 4-2, 4-3, and 4-4 as follows:

1. In the Quantity column, write the number of each type of component.
2. Multiply the entry in the Quantity column by the number in the @ Power (Watts) column, and enter the result in the AC Power (Extended) column.
3. Add the values in the AC Power (Extended) column, and enter the sum on the bottom line. This value indicates the maximum power requirement for each power source.

Table 4-2. Worksheet for Determining A-Side Power Requirements

System Component	Quantity		@ Power (Watts)		AC Power (Extended)
Express5800/320Fc-LR system		x	550	=	
Express5800/320Fc-MR system		x	850	=	
KVM switch		x	20	=	
TOTAL A-SIDE POWER REQUIREMENTS					

Table 4-3. Worksheet for Determining B-Side Power Requirements

System Component	Quantity		@ Power (Watts)		AC Power (Extended)
Express5800/320Fc-LR system		x	550	=	
Express5800/320Fc-MR system		x	850	=	
TOTAL B-SIDE POWER REQUIREMENTS					

Table 4-4. Worksheet for Determining External Power Requirements

System Component	Quantity		@ Power (Watts)		AC Power (Extended)
Other external components					
TOTAL EXTERNAL POWER REQUIREMENTS					

Power Outlet Requirements

If you **do** use a pair of PDUs in the cabinet, use Tables 4-5 and 4-6 to determine the total number of power outlets required **outside the cabinet**.

1. In the Quantity column, write the number of each type of component.
2. Multiply the value in the Quantity column by the value in the Outlets column, and enter the total in the Subtotal column.
3. Add the values in the Subtotal column and enter the sum next to TOTAL NUMBER OF A-SIDE POWER OUTLETS and TOTAL NUMBER OF B-SIDE POWER OUTLETS.

Table 4-5. Worksheet: A-Side External Power Outlet Requirements - PDUs Used

Component	Quantity		Outlets	Subtotal
PDUs		**x**	1	
Other external components				
TOTAL NUMBER OF A-SIDE POWER OUTLETS				

Table 4-6. Worksheet: B-Side External Power Outlet Requirements - PDUs Used

Component	Quantity		Outlets	Subtotal
PDUs		**x**	1	
Other external components				
TOTAL NUMBER OF B-SIDE POWER OUTLETS				

If you do **not** use PDUs in the cabinet, use Tables 4-7 and 4-8 to determine the number of power outlets required **outside the cabinet**.

1. In the Quantity column, write the number of each type of component.
2. Multiply the value in the Quantity column by the value in the Outlets column, and enter the total in the Subtotal column.
3. Add the values in the Subtotal column and enter the sum next to TOTAL NUMBER OF A-SIDE POWER OUTLETS and TOTAL NUMBER OF B-SIDE POWER OUTLETS.

Table 4-7. Worksheet: A-Side External Power Outlet Requirements - No PDUs

Component	Quantity		Outlets	Subtotal
Express5800/320Fc systems		**x**	1	
TOTAL NUMBER OF A-SIDE POWER OUTLETS				

Table 4-8. Worksheet: B-Side External Power Outlet Requirements - No PDUs

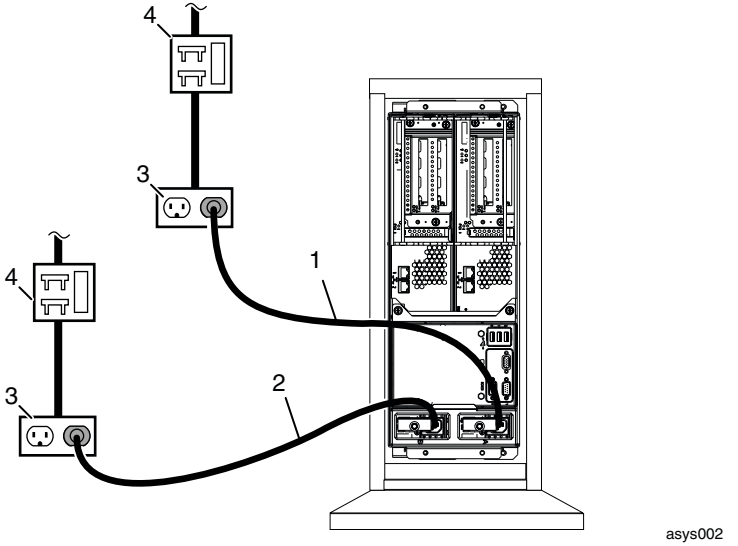
Component	Quantity		Outlets	Subtotal
Express5800/320Fc systems		**x**	1	
TOTAL NUMBER OF B-SIDE POWER OUTLETS				

Connecting a System Directly to Two Separate Power Sources

If you do not connect your Express5800/320Fc system or PDUs to a UPS, provide two AC power sources that are as electrically independent of each other as the installation site allows. At a minimum, the two power sources must be powered by separate circuit breakers (maximum of 20A) to AC power and, if possible, be independent of each other beyond that level. The more electrical separation between the two power sources, the less likely they will both fail at the same time. Due to redundancy in Express5800/320Fc systems, power to either side of the system keeps the system in operation, although the system is no longer fault-tolerant with regard to power.

Figure 4-1 shows how to connect a pedestal system directly to two separate power sources.

Figure 4-1. Pedestal System Connected Directly to AC Power



1 A-side system power cord

2 B-side system power cord

3 AC power outlets

4 Circuit breakers (maximum of 20A)

NEC-Supplied Power Cords

NEC Corporation of America supplies power cords for:

- Express5800/320Fc systems
- PDUs
- KVM switches

WARNING

Place all power cords out of the way of foot traffic.

Power cords described as Domestic are made with American Wire Gauge (AWG) cordage and are intended for use in North America. Refer to UL 62 and CSA C22.2, No. 49.

Power cords described as International are made with International Harmonized cordage and are intended for use outside of North America.

System Power Cords

Table 4-9 lists the available power cords for Express5800/320Fc systems that connect directly to an AC power source (not to a PDU or to a UPS).

Table 4-10 lists the available power cords that connect Express5800/320Fc systems to qualified UPS models from American Power Conversion (APC).

Table 4-9. System Power Cords to AC Power

Locale	Plug Type	Rating	Length	Marketing ID
North America and Japan locking power cord	NEMA L6-20	20A/250V	15 ft (4.5m)	B50161
International, locking power cord	IEC 60309 (formerly IEC 309)	16A/250V	4.5m	B50153
North America (Chicago)	NEMA 5-15	15A/127V	7 ft	B50101
North America (domestic)	NEMA 5-15	15A/127V	15 ft	B50104
Australia	AS/NZS 3112:1993	10A/250V	4.5m	B50124
China	GB1002-1996	10A/250V	4.5m	B50162
Europe (Continental)	CEE 7 VII	16A/250V	4.5m	B50112
Israel	SI 32:1971	16A/250V	4.5m	B50132
Italy	CEI23-16	10A/250V	4.5m	B50136
Japan	NEMA 5-15	15A/127V	15 ft (4.5m)	B50160
South Africa/India	SABS164-1:1992 ZA/3	13A/250V	4.5m	B50152
Switzerland	SEV 1011-S24507	10A/250V	4.5m	B50140
United Kingdom	BS 1363/A,	13A/250V	4.5m	B50116

Table 4-10. Systems: Power Cords to a UPS

Locale	Voltage Rating	Plug Types	Length	Marketing ID
North America (Chicago) and Japan	120V	NEMA 5-15 to IEC 60320 (formerly 320) C13	15 ft (4.5m)	B50104

Table 4-10. Systems: Power Cords to a UPS

Locale	Voltage Rating	Plug Types	Length	Marketing ID
North America (Domestic) and Japan	250V	NEMA L6-20 to IEC 60320 C13	15 ft (4.5m)	B50161
International	250V	IEC 320 C14 to IEC 60320 C13	3.5m	B50301

PDU Power Cords

The AA-P41104 PDU supplies power to Express5800/320Fc systems. Table 4-11 lists the available power cords to connect PDUs directly to an AC power source or to the APC® Smart-UPS® and APC Symmetra® UPS models.

Table 4-12 describes the black power (*jumper*) cables that are provided to connect Express5800/320Fc systems to PDUs.

Table 4-11. PDU Power Cords to AC Power

Locale	Plug Type	Rating	Length	Marketing ID
North America and Japan†	IEC 60320 (formerly 320) C19 to NEMA L6-20P	20A/250V 50–60 Hz	15 ft (4.5m)	B50155
North America	IEC 60320 C19 to NEMA L6-30P (Receptacle must be fused at no more than 20A)	30A/250V 50–60 Hz	15 ft	B50156
International †	IEC 60320 C19 to IEC 60309	20A/250V 50–60 Hz	15 ft (4.5m)	B50154

† Use this power cord to connect the PDU directly to the AC power mains or to a UPS.

Table 4-12. System Power (*Jumper*) Cables to a PDU

Length	Rating	Plug Type to System	Plug Type to PDU	Marketing ID
2.0m	10A/250V	IEC 320 C13	IEC 60320 (formerly IEC 320) C14	B50502

Power Cords for Optional Components

Table 4-13 lists the available power cords to connect to KVM switches directly to external AC power sources.

Table 4-13. Power Cords for Optional Components

Locale	Rating	Plug Type	Length	Marketing ID
North America and Japan	15A/120V	NEMA 5-15	7 ft	B501-01
North America and Japan	15A/120V	NEMA 5-15	10 ft	B501-02
United States (Domestic)	15A/127V	NEMA 5-15	10 ft	B501-06
Australia	10A/250V	AS/NZS 3112:1993	2.5m	B501-21
China (CCC)	10A/250V	GB1002-1996	2.5m	B50162-8F
Europe (Continental)	16A/250V	CEE 7 VII	2.5m	B501-09
India	13A/250V	SABS164-1:1992; ZA/3	2.5m	B501-49
Israel	16A/250V	SI 32:1971	2.5m	B501-29
Italy	16A/250V	CEI23-16;	2.5m	B501-33

Table 4-13. Power Cords for Optional Components *(Continued)*

Locale	Rating	Plug Type	Length	Marketing ID
New Zealand	10A/250V	AS/NZS 3112:1993	2.5m	B501-21
South Africa	13A/250V	SABS164-1:1992; ZA/3	2.5m	B501-49
Switzerland	10A/250V	SEV 1011-S24507	2.5m	B501-37
United Kingdom	13A/250V	BS1363/A	2.5m	B501-13

Chapter 5
UPS Planning

For information about planning for an uninterruptible power supply (UPS) to use with your Express5800/320Fc system, see:

- "Qualified APC UPS Models" on page 5-1
- "Communicating with a UPS over a Network" on page 5-2
- "Connecting Power to Systems, PDUs, and a UPS" on page 5-2
- "Connecting a System Directly to a UPS" on page 5-3

Qualified APC UPS Models

NEC Corporation of America has qualified certain UPS models from American Power Conversion Corporation (APC) for use with Express5800/320Fc systems. The qualifiedAPC Symmetra and APC Smart-UPS models are listed in Tables 5-1, and 5-3.

NOTE

Site planning information for the UPS, which you must supply, is of a general nature only. Do not rely exclusively on the UPS information in this document. Contact APC at http://www.apcc.com for detailed UPS specifications, documentation, and ordering information.

Table 5-1. APC Symmetra Models for PDUs or for Multiple Systems

Locale	APC Symmetra Model	AC Power Input	AC Power Output
North America	SYH2K6RMT-P1, SYH4K6RMT-P1, SYH6K6RMT-P1, SYA8K16RMP, or SYA12K16RMP With SYA8K16RMP and SYA12K16RMP, also order AP7582, a rack PDU extender.	120V	120V or 208V

Table 5-1. APC Symmetra Models for PDUs or for Multiple Systems

Locale	APC Symmetra Model	AC Power Input	AC Power Output
Japan	SYH2K6RMJ-P1, SYH4K6RMJ-P1, or SYH6K6RMJ-P1	100V	100V or 200V
Rest of the world	SYK2K6RMI, SYK4K6RMI, SYK6K6RMI, SYA8K16RMI, or SYA12K16RMI	230V	230V or 240V

Table 5-3. APC UPS Models for a Single Pedestal System

Locale	Smart-UPS	AC Power Input	AC Power Output
North America	Model SUA1500	120V	120V or 208V
Japan	Model SUA1500J	80V to 123V	100V
Rest of the world	Model SUA1500I	160V to 286V	230V or 240V

Communicating with a UPS over a Network

Use the following additional tools to enable an Express5800/320Fc system and a UPS to communicate over the network:

- APC Network Management Card EX (APC part number AP9617)

  An APC Network Management Card EX is a standard component of the Symmetra UPS, but you must purchase the network card for the APC Smart-UPS.

- APC PowerChute® Network Shutdown for the Express5800/320Fc system

  When you install your Express5800/320Fc system, download PowerChute Network Shutdown from APC, and install and configure the tool on the system, as described in the *Express5800/320Fc: Software Installation and Configuration Guide*. PowerChute Network Shutdown monitors the UPS for an imminent power loss, and initiates a shutdown of the system before power is lost.

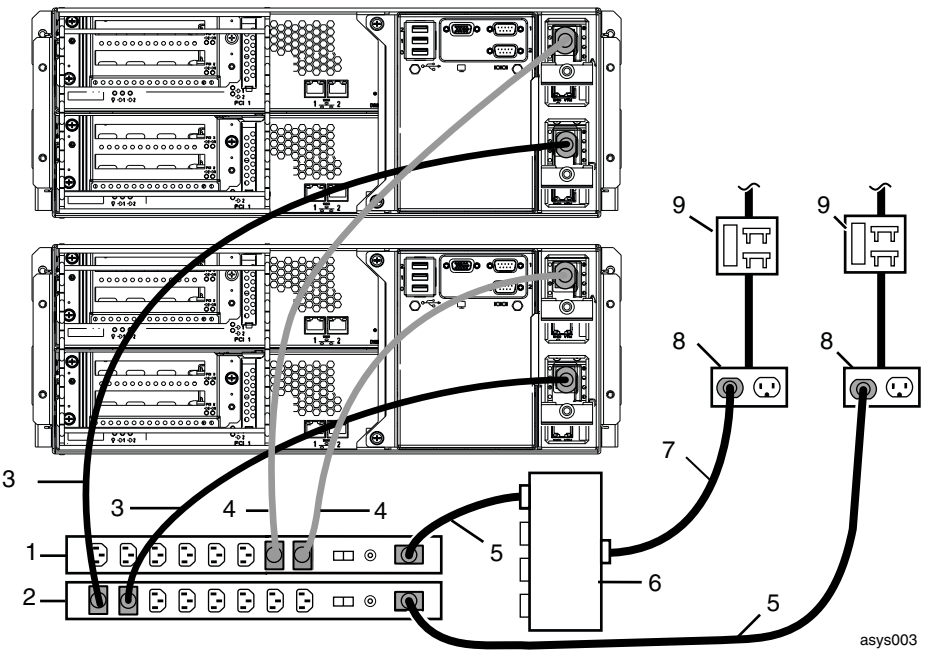
Connecting Power to Systems, PDUs, and a UPS

When you plan for PDUs, note the following:

- Only the top PDU is connected to the UPS.
- The bottom PDU is connected directly to an AC power main.
- The UPS can be connected to the same AC power main that the bottom PDU is connected to, or the UPS can be connected to another AC power main.

Figure 5-1 shows how to connect systems to PDUs and a UPS to the top PDU.

Figure 5-1. Power Cord Connections for Systems, PDUs, and a UPS



1 A-side PDU

2 B-side PDU

3 B-side system power cables (black)

4 A-side system power cables (gray)

5 PDU power cords

6 UPS

7 UPS power cord

8 AC power outlets

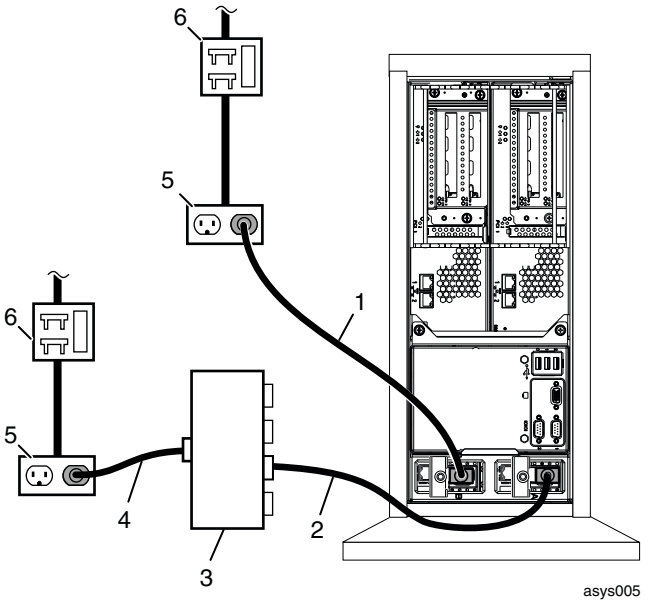
9 AC power (mains) distribution circuit breaker (maximum of 20A)

Connecting a System Directly to a UPS

You can connect the A-side power connectors of your system directly to a UPS, as shown in Figure 5-2.

Figure 5-2 shows how to connect a UPS to pedestal Express5800/320Fc systems.

Figure 5-2. Pedestal Systems: A-Side Power Connected Directly to a UPS



1 B-side system power cord

2 A-side system power cord

3 UPS

4 UPS power cord

5 AC power outlets

6 Circuit breakers (maximum of 20A)

Chapter 6
Network and Telephone Line Planning

For information about planning network and telephone lines for your Express5800/320Fc system, see:

- "Network Cable Requirements" on page 6-1
- "Telephone Line Requirements" on page 6-2
- "Site Planning for Systems in an ftGateway Group" on page 6-3

Network Cable Requirements

Ethernet PCI adapters are typically supplied in pairs and teamed in software for fault tolerance. Each member of the pair requires a cable.

WARNING

Make sure Ethernet cables can be routed out of the way of foot traffic.

Table 6-1 describes the Ethernet cables you must supply. Be sure to provide a cable of sufficient length for the distance between the system and a wall jack or hub.

NOTE

See the *Express5800/320Fc: PCI Adapter Guide* for more information about the adapters NEC Corporation of America supplies for your Express5800/320Fc system.

Table 6-1. Customer-Supplied Ethernet Cables

Component	Quantity	Cable
VTM Ethernet port†	2	24 AWG Unshielded Twisted Pair (UTP) EIA/TIA-Verified, Category-3 or Category-5 wire, with RJ-45 modular connectors terminated with pair-wiring adhering to the EIA/TIA 568-A or EIA/TIA 568-B standard. For connections to an Ethernet hub or switch, provide a straight-through cable. For 100- or 1000-Mbps (fast Ethernet) operation, provide full-duplex, or Category-5 Ethernet cables. The maximum allowable distance from an Ethernet port to a switch or a hub is 100 meters (328 ft).
10/100/1000-Mbps system Ethernet port	2 or 4	
Dual-port 10/100/1000Base-T Ethernet PCI Adapter (gigabit copper adapter for servers)	2 for each pair of 10/100/1000Base-T Ethernet ports	
Dual-port 1000Base-SX Ethernet PCI Adapter (gigabit fiber-optic adapter for servers)	2 for each pair of 1000Base-SX Ethernet ports	Multimode, 62.5- or 50-micron, DUAL fiber cable with LC-type connectors to the PCI adapter, and connectors on the other end that are compatible with the network switch. The maximum distance between the U574 PCI adapter and a switch is 902 ft (275m).

† Some systems may not contain Virtual Technician Modules (VTMs), a system management module that provides remote access to and management of the system.

Telephone Line Requirements

Generally, a telephone line is required to ensure technical support for your Express5800/320Fc system.

Appendix A
System Specifications

NOTE

The system temperature and humidity requirements, defined in Table A-1 are the **minimum** requirements the site must provide.

System Specifications

Figure A-1 shows the front of a pedestal Express5800/320Fc system, its bezel pulled forward. Figure A-2 shows the rear of a typical pedestal Express5800/320Fc system, and Figure A-3 shows the rear of a pedestal Express5800/320Fc systems, specifying the locations of the connectors at the back of the system. Table A-1 lists specifications for the pedestal Express5800/320Fc system.

Figure A-1. Pedestal System - Front View

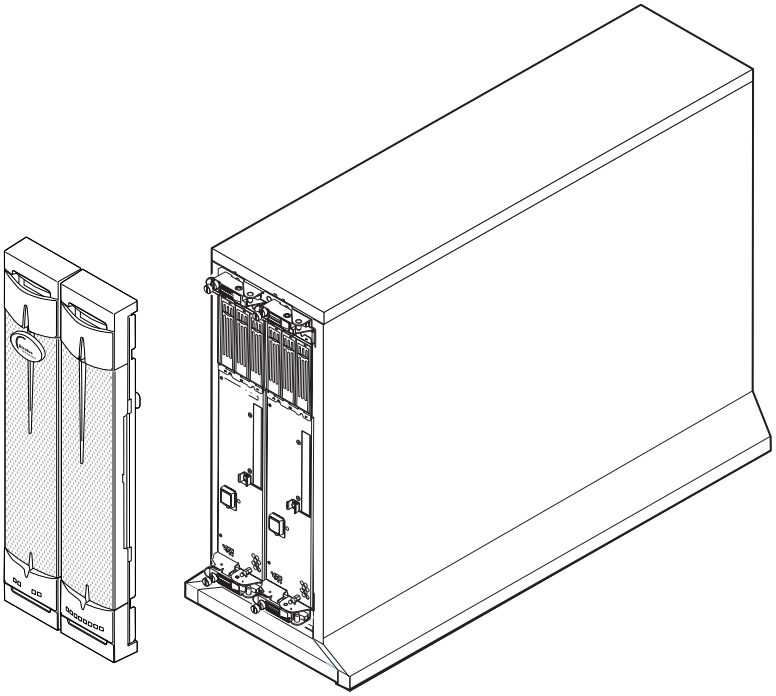
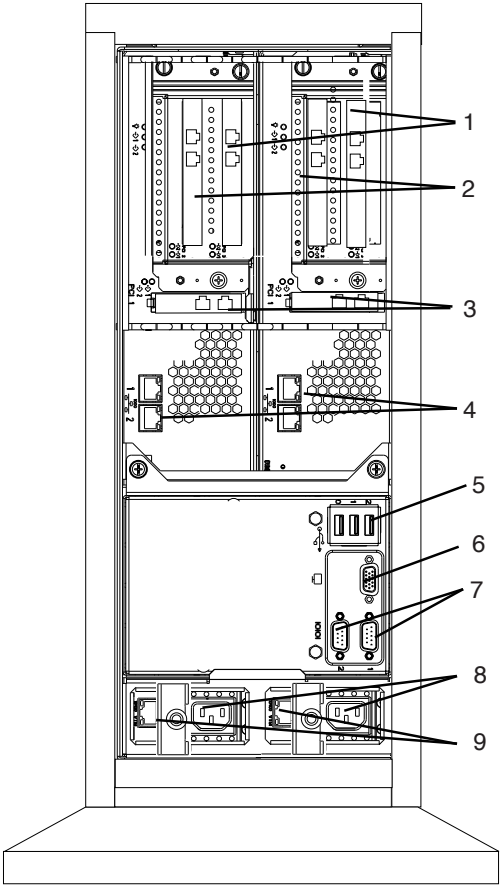


Figure A-3. Pedestal Express5800/320Fc systems- Rear View



1 PCI slot 3
2 PCI slot 2
3 PCI slot 1
4 System 10/100/1000-Mbps Ethernet ports (4)
5 USB ports (3)
6 VGA (monitor) port
7 Serial (COM) ports (2)
8 Power receptacles (2)
9 VTM 10/100-Mbps Ethernet ports (2)

Table A-1. Pedestal System Specifications

Power	
Input power	A-side enclosure: 650W B-side enclosure: 650W
Nominal input voltage (AC)	100-230 volts +/- 10% 240V + 6%/-10%; 50/60 Hz
Protective earth ground current	3.5 milliamperes maximum for each AC power cord
Physical Dimensions of System in a Pedestal Case	
Height	23.25 in. (59.05 cm.)
Width	8.62 in. (21.89 cm); 12.88 in. (32.72 cm)
Depth	31.38 in. (79.71 cm)
Weight, including 8 DIMMS, 4 processors, and 6 disks	Two enclosures: 110 lb (49.9 kg), fully loaded Case: 68 lb (30.84 kg)
Environmental	
Operating temperature	41°F to 95°F (5°C to 35°C) For every 800 ft (243.8m) above 2,000 ft (609.6m), lower the maximum operating temperature (35°C) by 1°C.
Storage temperature	-38° F to 140° F (-40° C to 60° C)
Operating altitude	0 ft to 10,000 ft (0m to 3,048m)
Maximum rate of temperature change during operation	18°F/hr (10°C/hr) or 0.30°F/min (0.17°C/min)
Relative humidity during operation	20% to 80% (noncondensing)
Relative humidity during storage	8% to 80%
Heat dissipation	4432 BTUs per hour

Table A-1. Pedestal System Specifications *(Continued)*

Features	
Processors	Express5800/320Fc-LR systems: one or two Intel Xeon Dual Core processors with Hyper-Threading Technology in each CPU-I/O enclosure. Express5800/320Fc-MR systems: one or two Intel Xeon Quad Core processors with Hyper-Threading Technology in each CPU-I/O enclosure.
Memory	Six physical dual data rate (DDR) inline memory module (DIMM) slots in each CPU-I/O enclosure
Ports	Four 10/100/1000-Mbps Ethernet ports Two AC power connectors, one VGA port, two serial ports, and three USB ports
PCI slots	Express5800/320Fc systems: One user-configurable, low-profile PCI adapter slot operating at 64-bits and 100 MHz in each CPU-I/O enclosure (you can add two full-height PCI adapter slots in each CPU-I/O enclosure)
VTM	Virtual Technician Module (VTM) The VTM is a system management module. When VTMs are installed, two 10/100-Mbps Ethernet ports dedicated to the VTMs are present.
Disk drives	Six SAS or two SAS + four SATA disk drives

Appendix B
Electrical Circuit and Wiring Information

For electrical circuit and wiring information that you need to provide to the contractor and/or facilities personnel responsible for wiring the power at the system installation site, see:

- "Fault Protection Requirements" on page B-1
- "Grounding Considerations" on page B-1
- "Circuit Wiring Diagrams" on page B-3
- "Electrical Power Connectors" on page B-9

Fault Protection Requirements

Each enclosure in Express5800/320Fc systems contains internal fault/overload current protection. However, the system relies on the power distribution system at your site for protection against potential faults in the power cords and the wiring in the system base.

- If you are using a pair of PDUs in the cabinet, use 30A or less circuit breakers in each power distribution branch that feeds the PDUs.
- To connect a single system to power, use 20A or less circuit breakers in each power distribution branch that feeds the systems.

Grounding Considerations

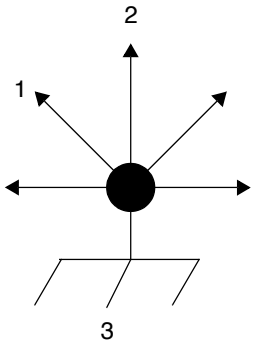
The system obtains an earth reference ground through the power cords attached to the system. Similarly, each peripheral device connected to the system obtains ground through its power cord. For each peripheral device, you **must** ensure that a high-integrity safety-ground conductor is installed as part of the wiring system (in accordance with U.S. national electric code NFPA 70 or the equivalent). The international safety standard (EN60950) for electronic data processing (EDP) equipment also requires a ground conductor, but calls it a protective earth (PE) ground.

Depending upon local conditions, ground potentials may differ between the system base and any peripheral devices connected to the system base. All grounds in the system **must** return to the same reference point in the power distribution system, as close as possible to **zero (0) volt potential** relative to earth reference ground. Earth

reference ground is typically a metal stake in the ground to which the ground conductors from one or more buildings are attached.

As shown in Figure B-1, a *star ground* is often used to obtain the same earth reference ground. Each earth reference ground, such as the system base ground, is returned separately to a common point where a zero-volt (0V) earth ground exists. The star ground ensures that all equipment is at the same potential and that no noise or safety problems associated with an unpredictable or uncharacterized grounding system will occur.

Figure B-1. Star Ground Example



1 To monitor

2 To Express5800/320Fc system

3 Earth reference ground (0V)

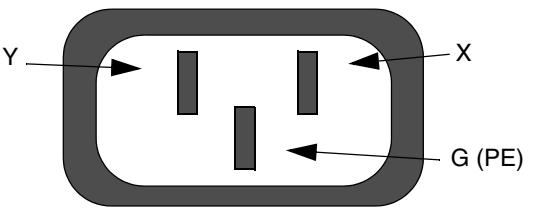
Circuit Wiring Diagrams

The following circuit wiring diagrams show how the hot, ground, and/or neutral AC signals should be connected to the system's power input plug:

- Figure B-3 illustrates a single-phase 120-volts AC circuit connection.
- Figure B-4 illustrates a single-phase 240-volts AC circuit connection.
- Figure B-5 illustrates a split-phase 120/240-volts AC circuit connection.
- Figure B-6 illustrates a three-phase 208-volts AC, Y-, or Δ-source circuit connection, phase-to-neutral.
- Figure B-7 illustrates a three-phase 208-volts AC, Y-, or Δ-source circuit connection, phase-to-phase.
- Figure B-8 illustrates a three-phase 380V AC, Y-, or Δ-source circuit connection, phase-to-neutral.

In the diagrams in this appendix, the power inputs for an Express5800/320Fc system are labeled X and Y, as shown in Figure B-2, to eliminate any ambiguities in the nomenclature. For single-phase applications, the X input is connected to the L (Line) *hot* input, and the Y input is connected to the N (Neutral) input. However, for split-phase or three-phase applications, the X and Y inputs are connected to L1, L2, or L3 (separate lines). Therefore, for split-phase or three-phase applications, both X and Y can be electrically hot with respect to the system base (earth reference ground). Figure B-2 shows the physical locations of the X and Y inputs on the system base.

Figure B-2. Power Input Labeling



Power input A or B (Face View)

Figure B-3 shows a single-phase 120-volts AC circuit connection. Note that this application requires a single-pole circuit breaker.

Figure B-3. Single-Phase 120-Volts AC Circuit Connection

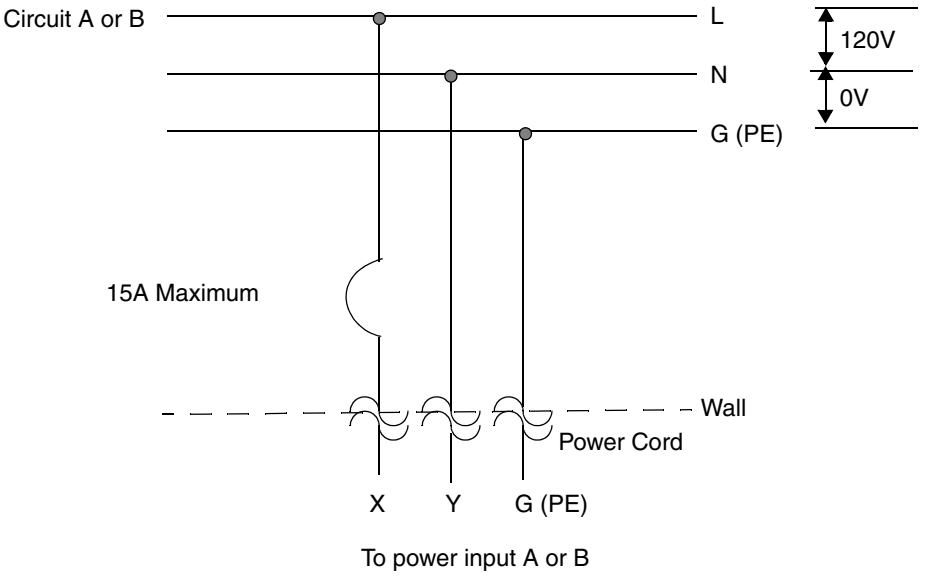


Figure B-4 shows a single-phase 240-volts AC circuit connection. Note that this application requires a single-pole circuit breaker.

Figure B-4. Single-Phase 240-Volts AC Circuit Connection

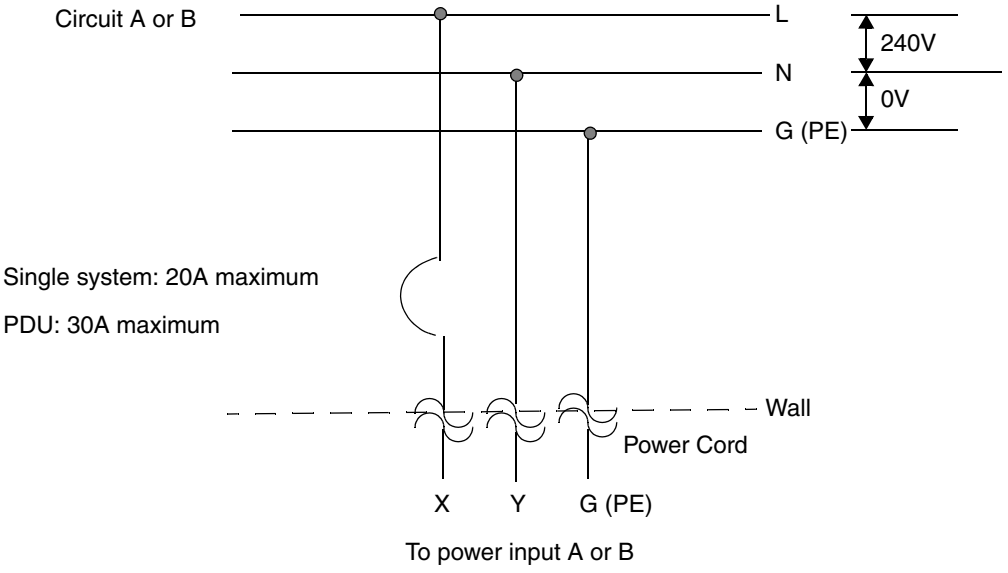


Figure B-5 shows a split-phase 120/240-volts AC circuit connection. Note that this application requires a double-pole circuit breaker.

Figure B-5. Split-Phase 120/240 Volts AC Circuit Connection

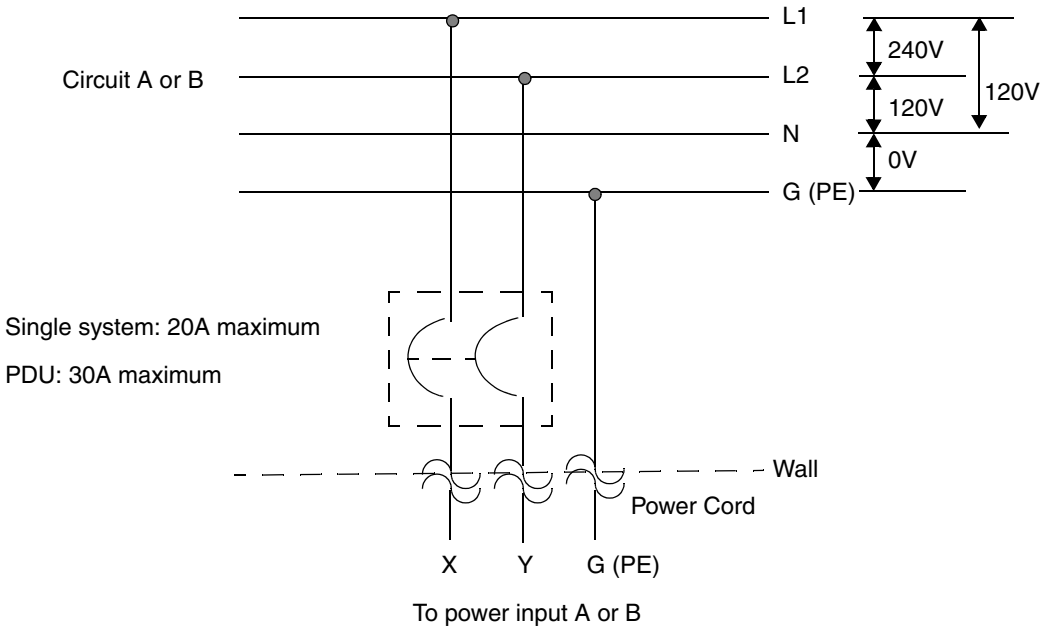


Figure B-6 shows a three-phase 208-volts AC, Y-, or Δ-source circuit connection, which is a phase-to-neutral source connection. Note that the X input on the system can be connected from L1, L2, or L3. This application requires a single-pole circuit breaker.

Figure B-6. Three-Phase 208-Volts AC, Y-, or Δ-Source Circuit Connection, Phase-to-Neutral

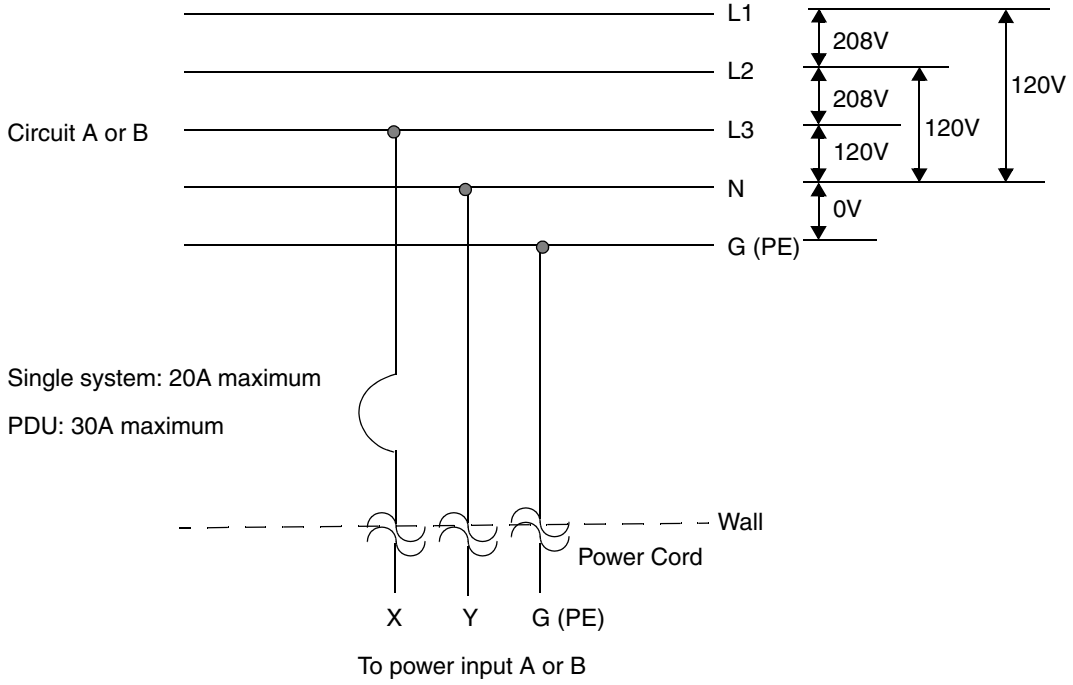


Figure B-7 shows a three-phase 208-volts AC, Y-, or Δ-source circuit connection, which is a phase-to-phase source connection. Note that the X and Y inputs on the system can be connected from L1 and L2, L2 and L3, or L1 and L3. This application requires a double-pole circuit breaker.

Figure B-7. Three-Phase 208-Volts AC, Y-, or Δ-Source Circuit Connection, Phase-to-Phase

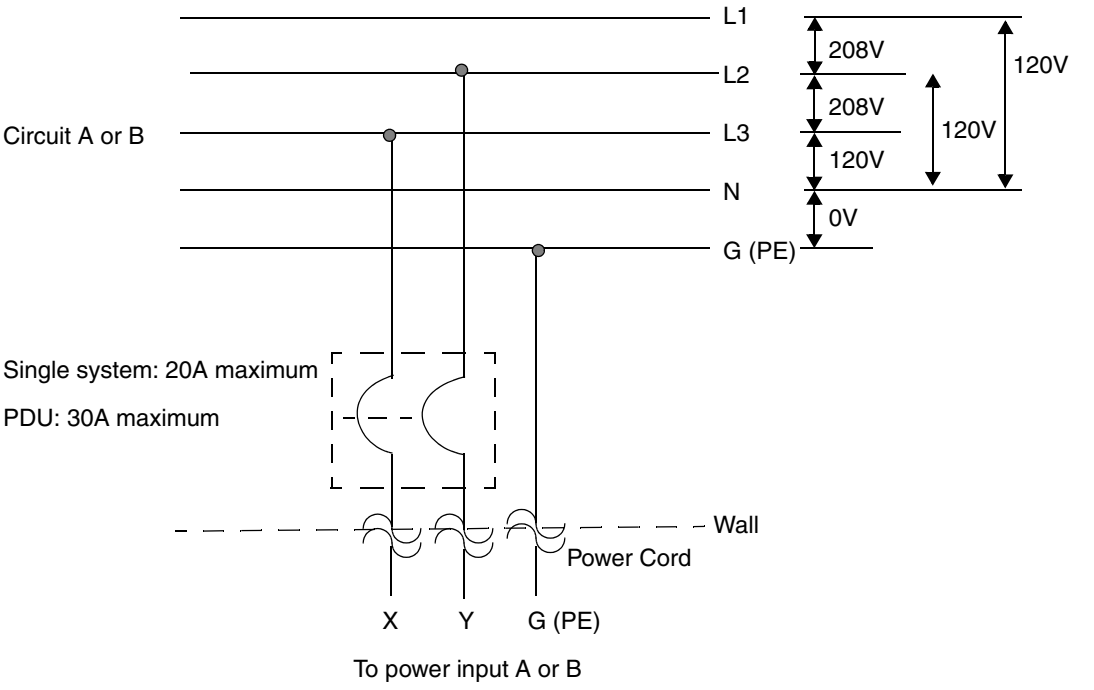
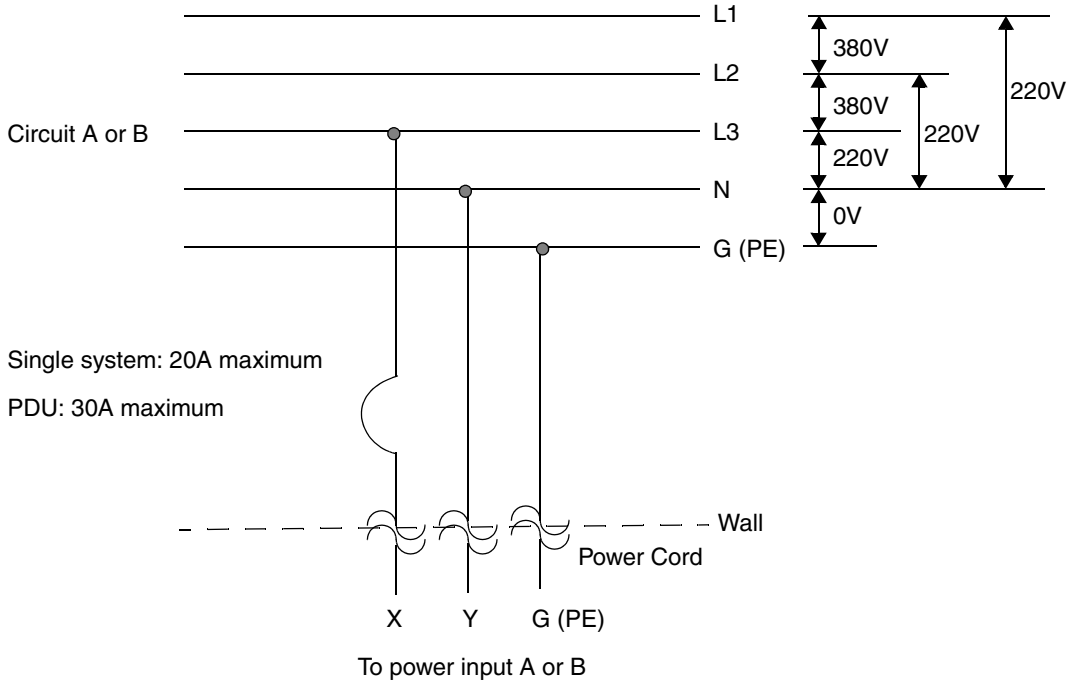


Figure B-8 shows a three-phase 380V AC, Y-, or Δ-source circuit connection, which is a phase-to-neutral source connection. Note that the system's X input can be connected to L1, L2, or L3. This application requires a single-pole circuit breaker.

Figure B-8. Three-Phase 380V AC, Y-, or Δ-Source Circuit Connection, Phase-to-Neutral



Electrical Power Connectors

Table B-1 describes the connectors that NEC Solutions (America), Inc. uses to connect an Express5800/320Fc system and peripheral devices to AC power outlets.

Table B-1. Connectors for AC Power Outlets

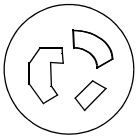
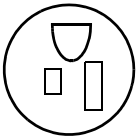
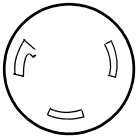
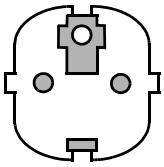
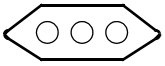
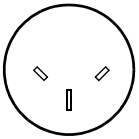
Connector	Configuration	Rating	Description
NEMA L6-20		20A, 250 volts AC	2-pole, 3-wire
NEMA 5-15		15A, 125 volts AC	2-pole, 3-wire
NEMA L6-30		30A, 250 volts AC	2-pole, 3-wire
CEE (7) VII		20A, 250 volts AC	2-pole, 3-wire
CEI-23-16		16A, 250 volts AC	2-pole, 3-wire
SI 32/1971		16A, 250 volts AC	2-pole, 3-wire

Table B-1. Connectors for AC Power Outlets *(Continued)*

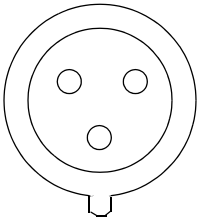
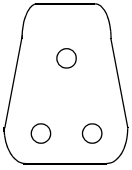
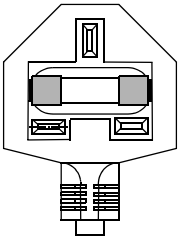
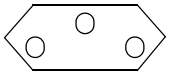
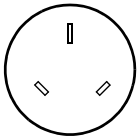
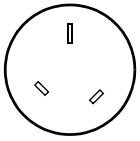
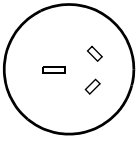
Connector	Configuration	Rating	Description
IEC 60309 (formerly IEC 309)		16-20A, 250 volts AC	2-pole, 3-wire
SABS 164-1:1992		16A, 250 volts AC	2-pole, 3-wire
BS 1363/A		13A, 250 volts AC	2-pole, 3-wire
SEV 1011-S24507		10A, 250 volts AC	2-pole, 3-wire
AS/NZS 3112-1993		15A, 250 volts AC	2-pole, 3-wire
SAA/3/15 AS/NZS 3112-1993		15A, 250 volts AC	2-pole, 3-wire

Table B-1. Connectors for AC Power Outlets *(Continued)*

Connector	Configuration	Rating	Description
GB1002-1996		10A, 250 volts AC	2 pole, 3-wire

Appendix C
Standards Compliance

Express5800/320Fc systems comply with the electromagnetic interference (EMI), immunity, safety, and noise regulations listed in Tables C-1 through C-4. All necessary agency labels are on the system.

NOTES

1. This system must be configured with the components listed and described in the product configuration specifications. Deviations from this list of components will void agency certification.
2. You must install all wiring, including power and communications cables, in compliance with local and national electrical code (in the United States, national electrical code NFPA 70). In addition, you must use shielded communications cables to remain in compliance with Federal Communications Commission (FCC) and other international Electromagnetic compatibility (EMC) regulations.
3. All EMI emissions compliance tests are performed at a third-party certified test laboratory. You can obtain compliance reports for these tests from your Express5800/320Fc account representative, who will contact the Product Compliance Group in the NEC Solutions (America), Inc. engineering organization.

Table C-1. EMI Standards

Standard	Description	Country/Region
FCC Part 15 Class A	Code of Federal Regulations 47 (1998) Class A	North America
EN 55022	Limits and methods of measurement of radio disturbance characteristics of Information Technology Equipment	European Union
AS/NZS 3548	Limits and methods of measurement of radio disturbance characteristics of Information Technology Equipment	Australia/New Zealand
CNS13438	Chinese National Standard 13438	Taiwan
VCCI Class A	Voluntary Control Council for Interference by Information Technology Equipment	Japan

Table C-2. Immunity Standards

Standard	Description	Country/Region
EN 50082-1	Generic Immunity Standard, Electromagnetic Compatibility, Residential, Commercial, and Light Industrial	European Union
EN 55024	Limits and methods of measurement of immunity characteristics of Information Technology Equipment	European Union

Table C-3. Safety Standards

Standard	Description	Country/Region
UL 60950	Safety of Information Technology Equipment	North America
EN 60950	Safety of Information Technology Equipment	European Union

Table C-4. Noise Standards

Standard	Description	Country/Region
ISO 9614-2	Acoustics. Determination of Sound Power Levels of Noise Source using Sound Intensity	European Union
ISO 7779	Measurements of Airborne Noise emitted by Computers and Business Equipment	European Union

VCCI Note

この装置は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準に基づくクラスＡ情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

BSMI Note

警告使用者
這是甲類的資訊產品、在居住的環境中使用時、可能會造成射頻干擾、在這種情況下、使用者會被要求採取某些適當適對策

Index

A

ActiveService Network (ASN). *See* ASN
AK533 riser assembly kit, A-6
American Power Conversion. *See* APC
APC
    Network Management Card EX, 5-2
    PowerChute Network Shutdown, 5-2
    qualified UPS, 5-1
AS/NZS 3112-1993 connector, B-11
A-side power source, 4-1
ASN, site planning, 1-2, 1-3, 3-2

B

BS 1363/A connector, B-11
B-side power source, 4-1

C

cabinets
    requirements, 2-1
cables
    Ethernet network, 6-1
    planning for, 3-2
    supplied, 3-2
    telephone, 3-2
CEE (7) VII connector, B-10
CEI-23-16 connector, B-10
checklist for site planning, 1-2
circuit, electrical
    planning information, B-1
    wiring diagrams, B-3
compliance, standards, C-1
connectors (AC), B-9
cooling requirements, 3-1
    See also environmental requirements, 3-1

D

documentation, ordering, 1-6

E

earth reference ground, B-1
electrical connectors, B-9
electrical grounding, B-1
electrical wiring, B-1
electromagnetic interference, C-2
environmental requirements
    maximum rate of temperature change, A-5
    operating humidity, A-5
    operating temperature, A-5
    storage humidity, A-5
Ethernet network cables, 6-1

F

ftGateway, site planning information, 6-3

G

GB1002-1996 connector, B-12
grounding the system, 2-2, B-1

H

hubs, network, 3-2

I

IEC 309 connector, B-11
IEC 60309 connector, B-11
immunity regulations, C-2

J

jacks, Ethernet, 3-2

K

KVM switches
    power service requirements, 4-2

M

monitors
power cords, 4-9
requirements, 2-4

N

NEC Technical Support, 1-2
NEMA 5-15 connector, B-10
NEMA L6-20 connector, B-10
NEMA L6-30 connector, B-10
network (Ethernet) cables, 6-1
noise regulations, C-2

P

power (AC)
cords
monitors, 4-9
storage enclosures, 4-9
systems, 4-7
electrical requirements, 4-2
PDU connections, illustrated, 5-3
service requirements, 4-2, 4-4, 4-5
A-side, 4-4
B-side, 4-4
sources, 4-1
sources, no UPS, 4-5
system connections, illustrated, 4-5, 4-6
UPS connections, illustrated, 5-4
wall outlets, 3-2, 4-4
printed documentation, ordering, 1-6
protective earth ground, B-1

R

racks
requirements, 2-1
room requirements, 3-1

S

SAA/3/15 AS/NZS 3112-1993 connector, B-11
SABS 164-1:1992 connector, B-11
safety regulations, C-2
SEV 1011-S24507 connector, B-11
SI 32/1971 connector, B-10
single-phase circuit connections
120 V AC, B-4
240 V AC, B-5
site planning checklist, 1-2
space planning, 3-1
specifications
AC power, 4-2
pedestal system, A-1
split-phase circuit connections
120–240 V AC, B-6
standards compliance, C-1
star ground, B-2
switches, network, 3-2
system power cords, 4-7

T

Technical Support, 1-2
Technical Support, getting assistance, 1-2
telephone lines
for ASN modem assembly, 1-3, 6-2
for support calls, 1-3, 6-2
three-phase circuit connections
208 V AC, B-7, B-8
380 V AC, B-9

U

UPS
PDU connections, 5-3
pedestal system connections, 5-4
site planning, 5-1
system connections, 5-3

V

Virtual Technician Modules. *See* VTMs
VTMs, site planning, 1-3

W

wiring, electrical, B-1